

WHAT IS CLAIMED IS:

1. A two dimensional ultrasonic transducer array probe comprising:

5 a two dimensional array of ultrasonic transducer elements having a bottom surface from which undesired ultrasonic energy is emitted; and

10 a conductive backing block assembly affixed in opposition to the bottom surface of the two dimensional array which comprises separate alternating plates of acoustic backing material and printed circuit substrates with conductive traces, the separate plates and printed circuit substrates being bonded together with adhesive located between the adjoining surfaces of the plates and
15 the printed circuit substrates.

2. The two dimensional ultrasonic transducer array probe of Claim 1, wherein the printed circuit substrates
20 comprise flex circuits.

3. The two dimensional ultrasonic transducer array probe of Claim 2, wherein the plates of acoustic backing material exhibit a thickness chosen to establish a predetermined elevational spacing between the flex
25 circuits.

4. The two dimensional ultrasonic transducer array probe of Claim 3, wherein the plates of acoustic backing material contain acoustic absorbent material and acoustic
30 scatterers.

5. The two dimensional ultrasonic transducer array probe of Claim 2, wherein the flex circuits extend beyond the ends of the plates at one end and the conductive
35 traces of the flex circuits terminate at the other end at

a surface of the conductive backing block assembly which opposes the two dimensional array.

5 6. The two dimensional ultrasonic transducer array probe of Claim 5, wherein the surface of the conductive backing block assembly at which the conductive traces terminate is conductively plated, wherein the conductive plating is in electrical contact with the conductive traces.

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 7. The two dimensional ultrasonic transducer array probe of Claim 6, wherein the conductively plated surface is divided into electrically separate areas corresponding to the footprint of elements of the array transducer when the transducer array is diced.

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 8. The two dimensional ultrasonic transducer array probe of Claim 1, wherein the adhesive is an epoxy adhesive.

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 9. A two dimensional ultrasonic transducer array probe comprising:

 a two dimensional array of ultrasonic transducer elements having a bottom surface from which undesired ultrasonic energy is emitted; and

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 a conductive backing block assembly affixed in opposition to the bottom surface of the two dimensional array which comprises a series of plates of acoustic backing material with conductive traces formed thereon which are adhesively bonded together.

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 10. The two dimensional ultrasonic transducer array probe of Claim 9, wherein the plates of acoustic backing material exhibit a thickness chosen to establish a

predetermined elevational spacing between the conductive traces.

5 11. The two dimensional ultrasonic transducer array probe of Claim 10, wherein the plates of acoustic backing material contain acoustic absorbent material and acoustic scatterers.

10 12. The two dimensional ultrasonic transducer array probe of Claim 9, wherein the plates exhibit different lengths so as to provide access to the conductive traces, and the conductive traces terminate at a surface of the conductive backing block assembly which opposes the two dimensional array.

15 13. The two dimensional ultrasonic transducer array probe of Claim 9, wherein the conductive traces terminate at a pad grid array on a surface of the conductive backing block where connections to the assembly are made.

20 14. The two dimensional ultrasonic transducer array probe of Claim 9, wherein the surface of the conductive backing block assembly at which the conductive traces terminate is conductively plated, wherein the conductive plating is in electrical contact with the conductive traces.

25 15. The two dimensional ultrasonic transducer array probe of Claim 14, wherein the conductively plated surface is divided into electrically separate areas corresponding to the footprint of elements of the array transducer when the transducer array is diced.

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16. The two dimensional ultrasonic transducer array probe of Claim 9, wherein the adhesive is an epoxy adhesive.

5 17. A conductive backing block assembly for a two dimensional ultrasonic transducer array comprising:
 plates of acoustic backing material; and
 printed circuit substrates located between the plates
10 of acoustic backing material and having conductive traces, wherein the plates and printed circuit substrates are bonded together with adhesive located between the adjoining surfaces of the plates and printed circuit substrates.

15 18. The conductive backing block assembly of Claim 17, wherein the printed circuit substrates comprise flex circuits.

20 19. The conductive backing block assembly of Claim 18, wherein the conductive traces of the flex circuits terminate at a surface of the assembly at which electrical connections are to be made to a two dimensional transducer array.

25 20. A conductive backing block assembly for a two dimensional ultrasonic transducer array comprising:
 plates of acoustic backing material having conductive traces formed thereon, wherein the plates are adhesively bonded together.

30 21. The conductive backing block assembly of Claim 20, wherein the conductive traces terminate at a surface of the assembly at which electrical connections are to be made to a two dimensional transducer array.

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22. The conductive backing block assembly of Claim 21, wherein the plates are of different lengths so as to provide access to the conductive traces at a side of the assembly.

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23. The conductive backing block assembly of Claim 21, wherein the conductive traces terminate at a pad grid array on a surface of the conductive backing block assembly where connections to the assembly can be made.

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24. A two dimensional ultrasonic transducer array probe comprising:

a two dimensional array of micromachined ultrasonic transducer elements having a bottom surface from which undesired ultrasonic energy is emitted; and

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a conductive backing block assembly affixed in opposition to the bottom surface of the two dimensional array which comprises separate alternating plates of acoustic backing material and printed circuit substrates with conductive traces, the separate plates and printed circuit substrates being bonded together with adhesive located between the adjoining surfaces of the plates and the printed circuit substrates.

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25. The two dimensional ultrasonic transducer array probe of Claim 24, wherein the printed circuit substrates comprise flex circuits.

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26. The two dimensional ultrasonic transducer array probe of Claim 25, wherein the micromachined ultrasonic transducer elements comprise capacitive micromachined transducer elements.

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27. The two dimensional ultrasonic transducer array probe of Claim 25, wherein the micromachined ultrasonic

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transducer elements comprise piezoelectric micromachined transducer elements.

5 28. A two dimensional ultrasonic transducer array probe comprising:

a two dimensional array of ultrasonic transducer elements having top faces, bottom faces, and electroded lateral faces which operate in the k_{31} mode; and

10 a conductive backing block assembly affixed in opposition to the bottom faces of the two dimensional array elements which comprises alternating layers of acoustic backing material and printed circuit substrates with conductive traces bonded together.

15 29. The two dimensional ultrasonic transducer array probe of Claim 28, wherein the printed circuit substrates comprise flex circuits.

20 30. The two dimensional ultrasonic transducer array probe of Claim 29, wherein the conductive traces of the flex circuits are electrically coupled to the electroded lateral faces of the transducer elements.

25 31. A two dimensional ultrasonic transducer array probe comprising:

a two dimensional array of ultrasonic transducer elements having top faces, bottom faces, and electroded lateral faces which operate in the k_{31} mode; and

30 a conductive backing block assembly affixed in opposition to the bottom faces of the two dimensional array elements which comprises a series of plates of acoustic backing material with conductive traces formed thereon which are bonded together.

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32. The two dimensional ultrasonic transducer array probe of Claim 31, wherein the conductive traces are electrically coupled to the electroded lateral faces of the transducer elements.

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